

Serial No. 10/634,880
Amendment dated January 18, 2006

Atty. Docket No. 253/028
Response to Office Action Made Final of Nov. 18, 2005

REMARKS/ARGUMENTS

Prior to entry of this amendment, claims 1-21 are pending in the subject application. By the instant amendment, claims 1, 3, 6, 10, 14 and 21 are amended, and claims 2, 4, 5, 7, 8, 13 and 15-20 are canceled. Claims 1 and 10 are independent.

Applicants respectfully request that, in the next Office action, the Examiner indicate whether the drawings filed on August 6, 2003, are accepted.

Claims 1, 3, 6, 9, 10-12, 14 and 21 are presented to the Examiner for further prosecution on the merits.

A. Introduction

In the outstanding Office Action Made Final, mailed November 18, 2005, the examiner maintained all of the rejections asserted in the Office action of May 31, 2005. In particular, the Examiner maintained the rejection of claims 1-19 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,391,793 to Lee et al. ("the Lee et al. reference"); maintained the rejection of claims 1-19 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,794,307 to Chen ("the Chen et al. reference"); maintained the rejection of claims 1-19 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 4,410,396 to Somers ("the Somers et al. reference"); and maintained the rejection of claims 1-19 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,132,522 to Verhaverbeke ("the Verhaverbeke et al. reference").

With respect to each of the rejections noted above, the Examiner asserted that "the applicant's amendments and arguments focus on the intended use of the composition." *Office Action Made Final of November 18, 2005, at paragraph 2, page 2.* Applicants respectfully disagree. To the extent an intended use of the composition is recited in the claims, it is done so simply to clarify the subject matter that the applicants regard as their

Serial No. 10/634,880
Amendment dated January 18, 2006

Atty. Docket No. 253/028
Response to Office Action Made Final of Nov. 18, 2005

invention. Applicants respectfully submit that the pending composition claims are patentable over the cited prior art based on the make-up of the composition, alone, regardless of the recited intended use.

Furthermore, with respect to applicants' arguments in the amendment filed August 30, 2005, applicants respectfully submit that the arguments *did not rely* on the intended use of the claimed composition, and argued significant distinctions between the claimed compositions and the cited prior art. Accordingly, applicants respectfully submit that the Examiner is obligated to consider and address these distinctions, which are summarized below.

Moreover, applicants note that presently pending claims 10-12 and 14 are directed to a method. Accordingly, the Examiner's assertion that "the applicant's claims are directed to a cleaning composition" is only partially correct. *Office Action Made Final of November 18, 2005, at paragraph 5, page 2*. In particular, applicants respectfully submit that a recitation of a use of a composition in a semiconductor etching method, as recited in presently pending claims 10-12 and 14, is wholly appropriate and must be given patentable weight.

B. Asserted Anticipation Rejection over the Lee et al. Reference

In the outstanding Office action, the Examiner maintained the rejection of claims 1-19 under 35 U.S.C. § 102(e) as being anticipated by the Lee et al. reference. By the instant amendment, independent claims 1 and 10 are amended to more particularly recite aspects of the present invention. Applicants respectfully submit that the Lee et al. reference fails to anticipate these claims for at least the reasons set forth below.

Serial No. 10/634,880
Amendment dated January 18, 2006

Atty. Docket No. 253/028
Response to Office Action Made Final of Nov. 18, 2005

Claim 1, as currently amended, recites, in part:

... a sufficient amount of nitric acid and a mixture of:
75-86% by volume of dimethylacetamide;
5-15% by volume of water; and
2-15% by volume of acetic acid, ammonium hydroxide,
and hydrofluoric acid, wherein the ratio of nitric acid to the
mixture ranges from about 1:200 to about 1:250,
to control the pH of the composition within the range of from about
6.5 to about 8.0 . . .

Applicants respectfully submit that the Lee et al. reference fails to disclose or suggest these claim elements.

Further, applicants note that the Examiner asserted that the Lee et al. reference teaches an oxidizing agent and teaches a pH range of 7 to about 8. However, this does not amount to disclosing that the amount of oxidizing agent present in the etchant is sufficient to control the pH in the stated range. As a particular example, applicants note that water may exhibit a pH of about 7 (neutral). However, the ionic strength of water may be negligible. Accordingly, the pH of the water may change dramatically if applied to a surface that had previously been treated with an acid or a base. That is, despite the fact the water may have an initial pH of 7, it contains nothing sufficient to control the pH at 7. Accordingly, by way of comparison, the mere disclosure of a solution having an oxidizing agent and a pH between about 6.5 to about 8.0 does not meet the requirement that the solution contain a sufficient amount of an oxidizing agent *to control* the pH in that range, as recited in independent claims 1 and 10.

As set forth in the specification of the subject application, the etching of silicon can be retarded "by adding an appropriate amount of an oxidizing agent." *See, e.g., paragraph [0051] of the subject application.* Accordingly, the failure of the Lee et al. reference to disclose this claim element is significant. In particular, the failure of the Lee et al. reference to disclose controlling the pH of the composition within the range of about

Serial No. 10/634,880
Amendment dated January 18, 2006

Atty. Docket No. 253/028
Response to Office Action Made Final of Nov. 18, 2005

6.5 to 8.0 is indicative of the fact that the Lee et al. reference is disclosing a different composition from that claimed by the inventors.

Independent claim 10 recites claim elements identical to those addressed above regarding claim 1. Accordingly, applicants respectfully submit that the Lee et al. reference fails to disclose each and every element of claims 1 and 10, and these claims are allowable. The remaining rejected claims depend, either directly or indirectly, from claims 1 and 10, and are believed to be similarly allowable.

Furthermore, as noted above, presently pending claims 10-12 and 14 recite a semiconductor etching *method*, wherein the use of the composition is directly relevant. Applicants respectfully submit that the Examiner failed to show how each and every aspect of the claimed method is disclosed by the Lee et al. reference. For example, in addition to the distinctions noted above, no showing was made regarding claim 12, which recites "wherein at least one layer comprising a material selected from the group consisting of W, Al, Ti, TiN and CoSi is exposed by the etching." Accordingly, applicants respectfully request that this rejection be reconsidered and withdrawn.

C. Asserted Anticipation Rejection over the Chen et al. reference

In the outstanding Office action, the Examiner maintained the rejection of claims 1-19 under 35 U.S.C. § 102(e) as being anticipated by the Chen et al. reference. By the instant amendment, independent claims 1 and 10 are amended to more particularly recite aspects of the present invention. Applicants respectfully submit that the Chen et al. reference fails to anticipate these claims for at least the reasons set forth below.

Claim 1 is currently amended, as noted above with regards to the Lee et al. reference. The Examiner asserted that the Chen et al. reference teaches an oxidizing agent and teaches a pH range of from about 4 to about 14. However, applicants respectfully

Serial No. 10/634,880
Amendment dated January 18, 2006

Atty. Docket No. 253/028
Response to Office Action Made Final of Nov. 18, 2005

submit that the Chen et al. reference fails to disclose, or even suggest, the subject matter presently recited in claims 1 and 10.

Also, as discussed above with regard to the Lee et al. reference, the mere disclosure of an oxidizing agent does not amount to disclosing or teaching a sufficient amount of an oxidizing agent to control the pH of the composition within the range of from about 6.5 to about 8.0.

Furthermore, the Chen et al. reference fails to disclose a composition including a hydroxyl ion (OH⁻). The Examiner asserts that the class of compounds including a hydroxyl ion is extremely broad. Such an assertion may be correct, but is insufficient to establish a *prima facie* case of anticipation with regard to every claim reciting that element. In other words, despite the breadth of the class, it is incumbent on the Examiner to point out how this claim element is disclosed in the cited prior art. With regards to the Chen et al. reference, the reference discloses that tetramethylammonium fluoride is generated from a reaction mixture of tetramethylammonium hydroxide and hydrofluoric acid, such that the hydroxyl ion of the tetramethylammonium hydroxide is reacted with the hydrogen ion of the hydrofluoric acid to generate water. Accordingly, the hydroxyl ion does not exist in the final composition. *See, e.g., the Chen et al. reference at col. 5, lines 4-10.* Therefore, the Chen et al. reference necessarily fails to anticipate claims 1 and 10. The remaining rejected claims depend, either directly or indirectly, from claims 1 and 10, and are believed to be similarly allowable. Therefore, applicants respectfully request that this rejection be reconsidered and withdrawn.

D. Asserted Anticipation Rejection over the Somers et al. reference

In the outstanding Office action, the Examiner maintained the rejection of claims 1-19 under 35 U.S.C. § 102(e) as being anticipated by the Somers et al. reference. By the

Serial No. 10/634,880
Amendment dated January 18, 2006

Atty. Docket No. 253/028
Response to Office Action Made Final of Nov. 18, 2005

instant amendment, independent claims 1 and 10 are amended to more particularly recite aspects of the present invention. Applicants respectfully submit that the Somers et al. reference fails to anticipate these claims for at least the reasons set forth below.

The Examiner asserted that the Somers et al. reference teaches an oxidizing agent and teaches the claimed pH range. However, applicants respectfully submit that the Somers et al. reference fails to disclose, or even suggest, the subject matter presently recited in claims 1 and 10. Moreover, the Somers et al. reference fails to disclose that the oxidizing agent is present in the etchant in an amount sufficient to control the pH in the stated range.

Finally, applicants respectfully submit that, contrary to the Examiner's assertion, the Somers et al. reference fails to anticipate the claimed pH range of "from about 6.5 to about 8.0." The passage from Somers that the Examiner quoted states "one has to make certain that the pH at the surface being stripped remains *below* that at which smut formation occurs (*5.3 in the case of copper*)" and also states that "it has been found that an initial pH of *not more than* 4.0 produces an effective system." *Office action of May 31, at page 8, bottom of page (emphasis added)*. A pH of below 5.3 is not within the claimed pH range of from about 6.5 to about 8.0. Further, there is no other disclosure or suggestion in the Somers et al. reference of a composition having a pH within the claimed range. Accordingly, the Somers et al. reference necessarily fails to anticipate claims 1 and 10. The remaining rejected claims depend, either directly or indirectly, from claims 1 and 10, and are believed to be similarly allowable. Therefore, applicants respectfully request that this rejection be reconsidered and withdrawn.

Serial No. 10/634,880
Amendment dated January 18, 2006

Atty. Docket No. 253/028
Response to Office Action Made Final of Nov. 18, 2005

E. Asserted Anticipation Rejection over the Verhaverbeke et al. reference

In the outstanding Office action, the Examiner maintained the rejection of claims 1-19 under 35 U.S.C. § 102(b) as being anticipated by the Verhaverbeke et al. reference. By the instant amendment, independent claims 1 and 10 are amended to more particularly recite aspects of the present invention. Applicants respectfully submit that the Verhaverbeke et al. reference fails to anticipate these claims for at least the reasons set forth below.

The Examiner asserted that the Verhaverbeke et al. reference teaches an oxidizing agent and teaches the claimed pH range. However, applicants respectfully submit that the Verhaverbeke et al. reference fails to disclose, or even suggest, the subject matter presently recited in claims 1 and 10. Moreover, the Verhaverbeke et al. reference fails to disclose that the oxidizing agent is present in the etchant in an amount sufficient to control the pH in the stated range.

Finally, applicants respectfully submit that the Examiner failed to show how the Verhaverbeke et al. reference anticipates the claimed pH range of "from about 6.5 to about 8.0" because the cited passage in the Verhaverbeke et al. reference does not state any pH value, but rather merely states a general principle that diluting the disclosed etchant lowers its pH value. *See the Office action of May 31, 2005, at page 8; the Verhaverbeke et al. reference, col. 2, lines 32-33.* Applicants respectfully submit that the Verhaverbeke et al. reference fails to disclose *any* composition having a pH in the claimed range. Indeed, the only disclosures of specific pH values falling within the claimed range are in the Background of the Invention section, where the Verhaverbeke et al. reference points out problems associated with a neutral pH deionized water rinse and pH 7 solutions. *The Verhaverbeke et al. reference, col. 2, lines 8-28 and lines 45-50.* Accordingly, applicants

Serial No. 10/634,880
Amendment dated January 18, 2006

Atty. Docket No. 253/028
Response to Office Action Made Final of Nov. 18, 2005

respectfully submit that the Verhaverbeke et al. reference fails to anticipate claims 1 and 10. The remaining rejected claims depend, either directly or indirectly, from claims 1 and 10, and are believed to be similarly allowable. Therefore, applicants respectfully request that this rejection be reconsidered and withdrawn.

F. Claims 20 and 21

Applicants added claims 20 and 21 by the amendment filed August 30, 2005. Claims 20 and 21 were entered, and the Examiner asserted in the outstanding Office action that they are rejected. However, as the outstanding Office action simply maintained the rejections asserted in the Office action mailed May 31, 2005, applicants respectfully submit that the Examiner did not consider the patentability of claims 20 and 21. Claim 20 is canceled by the instant amendment. However, applicants respectfully request that the Examiner indicate which, if any, of the cited prior art references are being relied upon to reject claim 21, and indicate the passages therein that are asserted to disclose or suggest the elements recited in claim 21.

G. Entry of Amendment Requested

Applicants respectfully submit that the pending claims are in condition for allowance, and that the instant amendments overcome the rejections set forth in the outstanding Office action. Accordingly, entry of the above amendment after final is respectfully requested.

H. Conclusion

For at least the reasons set forth above, applicants respectfully submit that the claimed composition and method are patentable over the cited prior art, as the cited prior art relied on to reject the claims of the subject application fails to disclose, or even suggest, the present invention as recited in claims 1, 3, 6, 9, 10-12, 14 and 21.

Serial No. 10/634,880
Amendment dated January 18, 2006

Atty. Docket No. 253/028
Response to Office Action Made Final of Nov. 18, 2005

Accordingly, applicants respectfully submit that the pending claims are in condition for allowance, and a notice to that effect is respectfully requested.

If the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.

In view of the foregoing amendments and remarks, reconsideration of this application is earnestly solicited, and an early and favorable further action upon all the claims is hereby requested.

Respectfully submitted,

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